

DESCRIPTION

TITLE OF THE INVENTION

[0001] A hairbrush with thermochromic filaments and the method of manufacturing the same

BACKGROUND OF THE INVENTION

[0002] The present invention relates to hairbrushes and more particularly pertains to a hairbrush with a plurality of filaments which is formulated by a mixture of thermo-sensitive color-changing powder and plastic materials, and the color of which varies with temperature, and the method of manufacturing such thermochromic filaments.

[0003] Hairbrushes available in the marketplace generally have a plurality of filaments or bristles which are made of natural materials such as wood or synthetic materials such as nylons or polymers of natural and synthetic materials. The filaments or bristles on a hairbrush not only detangle the hair making it tidy and smooth, but also stimulate the scalp giving the user a comfortable feeling and making the hair grow healthily. A hairbrush is often used to hold the hair in a desired position while using a hair dryer to blow hot air onto the hair for drying and/or styling. In order to quickly dry or style the hair, the user commonly applies a high level of heat to the hair continuously through the hair dryer, and it is not uncommon to get the hair damaged or even burnt by the continuous application of high heat onto the hair. This is especially the case for those with long or thick hair as when they sense the heat, their hair has already damaged by the hot air. Therefore, some hairbrushes have their filaments or bristles coated with a layer of reversibly thermochromic material, for example, thermochromic material sold under the trademark "Chromicolor" available from Matsui International Company, Inc., and the color of filaments or bristles changes with the surface temperature thereof. U.S. Patent No.

5,911,226 discloses a hair brush with bristles and the surface on which the bristles are mounted or protrude, the outer layer of which is made of reversibly thermochromic material. However, as the filaments or bristles as well as the said surface rub against the hair while combing, frequent use of the hair brush for a long period of time causes the coating on the filaments or bristles and the surface to wear off by friction and the filaments or bristles and the surface can no longer function as a temperature indicator.

BRIEF SUMMARY OF THE INVENTION

[0004] In view of the aforesaid disadvantages now present in the prior art, the present invention provides a hairbrush with a plurality of filaments, the entirety of which is formulated by a mixture of thermo-sensitive color-changing powder and plastic materials, and the color of which varies with temperature, and the method of manufacturing such thermochromic filaments.

[0005] To attain this, the present invention generally comprises a handle, a head which has a number of pre-set filament holes on its surface and is attached to the handle by any convenient means, and a plurality of filaments each of which is formulated in one piece by extrusion process from plastic material of 98% to 94% by weight plus a mixture of 2% to 6% by weight comprising melamine plastics of 6%, latent dye of 4.5%, fixing agent of 10%, fatty acid of 0.5% and metallic oxide of 79% by weight, and is attached to the filament holes by any convenient means.

[0006] In a preferred process to manufacture the filaments, a thermochromic composition is prepared by feeding melamine plastics of 0.12%, latent dye of 0.09%, fixing agent of 0.2%, fatty acid of 0.01% and metallic oxide of 1.58% and plastic material of 98% by weight into an extruder of a monofilament making machine; heat is added to melt the materials; the materials are mixed inside the extruder by

spinning to form molten polymer; the extruder barrel pushes the molten polymer out through a nozzle plate to form individual uniform wires; the wires are submerged into water for cooling to form strings of filaments; the filaments are steamed in a hot water bath and then stretched to a desired diameter; the annealed filaments are wound on a winder and then attached to the filament holes by any convenient means.

[0007] When the filaments are at a temperature under 45 °C, the filaments will exhibit a certain color.

[0008] When the filaments are heated to a temperature above 45 °C, the filaments will exhibit a color change. When the temperature rises further, the color will become stronger.

[0009] It is an object of the present invention to provide a hairbrush with a plurality of filaments which can change color with temperature, so as to provide a visual indication of the temperature of the hair around the hairbrush, thus preventing the user from overheating the hair and causing damage to it.

[0010] It is another object of the present invention to provide a hairbrush with thermochromic filaments of high durability, thus overcoming the disadvantages of the prior art.

[0011] It is a further object of the present invention to provide a manufacturing method of such thermochromic filaments which is economical as the filaments are formulated by a mixture of thermo-sensitive color-changing powder which constitutes only 2% to 6% by weight.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] FIG. 1 shows a perspective view of the hairbrush of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] As illustrated in FIG. 1, the hairbrush generally comprises a handle 1, a head 2 which has a number of pre-set filament holes 3 on its surface and is attached to the handle 1 by any convenient means, and a plurality of filaments 4 each of which is formulated in one piece by extrusion process from plastic material of 98% to 94% by weight plus a mixture of 2% to 6% by weight comprising melamine plastics of 6%, latent dye of 4.5%, fixing agent of 10%, fatty acid of 0.5% and metallic oxide of 79% by weight, and is attached to the filament holes 3 by any convenient means.

[0014] In a preferred process to manufacture the filaments 4, a thermochromic composition is prepared by feeding melamine plastics of 0.12%, latent dye of 0.09%, fixing agent of 0.2%, fatty acid of 0.01% and metallic oxide of 1.58% and plastic material of 98% by weight into an extruder of a monofilament making machine; heat is added to melt the materials; the materials are mixed inside the extruder by spinning to form molten polymer; the extruder barrel pushes the molten polymer out through a nozzle plate to form individual uniform wires; the wires are submerged into water for cooling to form strings of filaments 4; the filaments 4 are steamed in a hot water bath and then stretched to a desired diameter; the annealed filaments 4 are wound on a winder and then attached to the filament holes 3 by means of any convenient means. The head 2 with the filaments 4 on its surface is attached to the handle 1 by means of any convenient means.

[0015] When the filaments 4 are at a temperature under 45 °C, the filaments 4 will exhibit a purple color. When the filaments 4 are heated to a temperature above 45 °C, the filaments 4 will exhibit a color change from purple to red. When the temperature rises further, the red color will become stronger until the color becomes dark red, which indicates a temperature above 50 °C.

[0016] As to a further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description.

Accordingly, no further discussion relating to the manner of usage and operation is provided.

[0017] With respect to the above description, it is to be realized that the optimum relationships for the parts of the invention in regard to size, shape, form, materials, function and manner of operation, assembly and use are deemed readily apparent and obvious to those skilled in the art, and all equivalent relationships to those illustrated in the drawings and described in the specification are intended to be encompassed by the present invention.

[0018] The present invention is capable of other embodiments and of being practiced and carried out in various ways. It is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[0019] Therefore, the foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and equivalents may be resorted to falling within the scope of the invention.